

FLOWMETERS BASED ON THROTTLE DEVICES IN CRYOGENIC SUPPLY SYSTEMS OF THE NICA ACCELERATOR COMPLEX

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During the sessions of the NICA accelerator complex, an important task was to determine the performance of the cryogenic systems equipment in order to measure its operating efficiency. To determine the performance, it is necessary to measure the flow rate of the medium through the units. The paper considers cases of using diaphragms as part of the cryogenic complex equipment.

Successful experience in using flow meters of this type was obtained during the operation of the residual life monitoring system for adsorbents of the MO-800 No. 1-4 helium oil purification and drying units after installation and commissioning in 2024-25.

Measuring the flow rate of the medium through the main and turboexpander flows of the KGU-1600/4.5 helium refrigerator will allow determining the refrigeration capacity of the turboexpanders and optimizing its cycle, which will lead to a decrease in energy costs for obtaining cold. At the end of 2024, a calculation was made to select diaphragms. Their installation and commissioning of the software as part of the KGU-1600/4.5 No. 1 automated process control system, which ensures flow measurement, is scheduled for autumn 2025.

Monitoring the flow rate of compressed nitrogen through the PA-0.5 nitrogen recondenser will confirm the unit's passport parameters and its operating efficiency. The PA-0.5 No. 1 automated process control system will be commissioned in autumn 2025.

The flow meter installed on the nitrogen turbocompressor discharge line will measure the performance of each of them to confirm the equipment characteristics and, if necessary, carry out measures to bring them to passport values. The measurement system will determine the specific energy costs for obtaining liquid nitrogen for the nitrogen complex being created. Work is currently underway to select the diaphragm: the technical characteristics and instrumentation of the piping are being determined, installation is scheduled for 2026.

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